

## Earth Sciences Consultants, Inc.

One Triangle Lane • Export, Pennsylvania 15632 • Phone: (724) 733-3000 • Fax: (724) 325-3352  
Akron, Ohio • Philadelphia, Pennsylvania

February 8, 2001


Mr. E. Jonathan Jackson  
Fansteel Inc.  
Number One Tantalum Place  
North Chicago, IL 60064-3388

Transmittal  
Earth Sciences Consultants, Inc.  
Statement of Qualifications

Dear Mr. Jackson:

Pursuant to our conversation today, February 8, 2001, please find Earth Sciences Consultants, Inc.'s (Earth Sciences) Statement of Qualifications that you had requested. Included in this package is information detailing Earth Sciences' organization capabilities and experience. It also provides specific information on various engineering and geosciences services. If there is anything further your require, please do not hesitate to notify me.

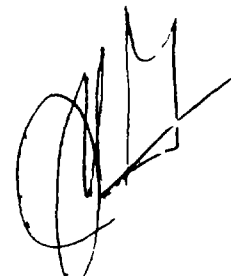
Sincerely,

  
Marcel D. Tourdot  
Executive Vice President

MDT:ljz

Enclosure

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EPA Region 5 Records Ctr.



229945

## History and Size

- ▶ Founded in 1979
- ▶ 75 Personnel
- ▶ Offices in Pittsburgh and Akron

## Business Highlights

- ▶ Projects Performed in More than 40 States
- ▶ Over 80% of Sales from Repeat Clients
- ▶ Comprehensive Insurance Coverage
- ▶ Financials Above Industry Norms

## Service Areas

- ▶ Air Quality
- ▶ Construction Management
- ▶ Corrective Action
- ▶ Engineering Design
- ▶ Geologic Services
- ▶ Industrial Compliance
- ▶ Liability Management
- ▶ Litigation Support
- ▶ Radiological Services
- ▶ Solid Waste Management
- ▶ Water Quality and Industrial Wastewater

## Technical Disciplines

- ▶ Chemical Engineering
- ▶ Civil Engineering
- ▶ Environmental Engineering
- ▶ Geotechnical Engineering
- ▶ Water Quality
- ▶ Chemistry
- ▶ Industrial Hygiene
- ▶ Hydrogeology
- ▶ Geochemistry
- ▶ Risk Assessment
- ▶ Soil Science

## The Earth Sciences Organization

**E**arth Sciences Consultants, Inc. is an environmental science and engineering company that has been serving clients throughout the United States since 1979. Our broad technical expertise, operational experience, and practical-solutions approach have resulted in 20 years of successfully assisting our clients with implementing their environmental objectives.

Earth Sciences is a nationally recognized environmental consulting and engineering firm and is ranked on the *Engineering News Record's* listing of the Top 500 Engineering Design Firms in the country. *Earth Sciences' clients include a variety of light and heavy industrial manufacturers, energy and utility companies, natural resources organizations, professional services firms, waste management companies, and public administration organizations.* Our staff is organized into a number of "service areas" which enable us to focus our resources on the technical, regulatory, and compliance issues affecting our particular areas of expertise. Each service area is managed by a senior member of our staff who has specialized education, training and several years of experience. Through this organization, we offer our clients the assurance that their project will be handled by a qualified group of professionals who understands the technical, regulatory, and business issues associated with their project.

Since 1979, Earth Sciences has completed thousands of projects throughout the United States. One hundred and twenty personnel in the Earth Sciences organization represent a wide variety of technical disciplines including civil, environmental, chemical, and geotechnical engineering; geology; geochemistry; hydrogeology; industrial hygiene and safety; chemistry; and biology.



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## Staff Capabilities and Experience

### Disciplines

Aquatic Ecosystems  
Biology  
Biostatistics  
Chemistry  
Chemical Engineering  
Civil Engineering  
Computer Science  
Engineering Geology  
Environmental Engineering  
Environmental Resource Management  
Geochemistry  
Geology  
Geotechnical Engineering  
Hydrogeology  
Industrial Hygiene  
Mining Engineering  
Risk Assessment  
Safety Management  
Soil Science  
Toxicology

**E**arth Sciences' success is due in large part to the talent and experience of our multidisciplinary staff. Earth Sciences attracts and retains dedicated and talented individuals representing a wide range of scientific and engineering disciplines. Earth Sciences promotes and supports ongoing education, licensing, and certification for our entire technical staff.

Earth Sciences currently has approximately 120 members located in offices in Pittsburgh, Akron, Philadelphia, and Arlington. Many are registered professionals and hold advanced degrees in their field. Several members of our staff are not only affiliated with professional societies but are also leaders and policy makers within these organizations.

Earth Sciences' staff is broadly organized into engineering and geosciences groups. Specific disciplines within these groups vary widely, representing over 20 different areas of study. Earth Sciences' project teams are hand picked to include a varied group of experienced professionals with the appropriate mix of educational background and hands-on experience. Project teams frequently include a cross section of disciplines represented at Earth Sciences, enabling us to provide our clients with the most technically appropriate, cost-effective solutions to their environmental challenges.



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## Integrated Environmental Services

- ▶ **Environmental Consulting Services**
- ▶ **Analytical Laboratory**
- ▶ **Environmental Remediation**
- ▶ **Waste Transportation**
- ▶ **Waste Disposal Management**

**E**arth Sciences is closely affiliated with two companies that complement our environmental science and engineering services. Antech Ltd. is a full-service environmental laboratory specializing in organic and inorganic analytical services as well as pilot-scale treatment evaluations. Antech is certified or approved by over 25 federal and state regulatory agencies, several USEPA regions, and the Department of Agriculture for the analyses of drinking water, wastewater, hazardous waste, and solid waste. The laboratory is also licensed by the NRC to handle samples containing low-level radioactive materials for all types of environmental analyses.

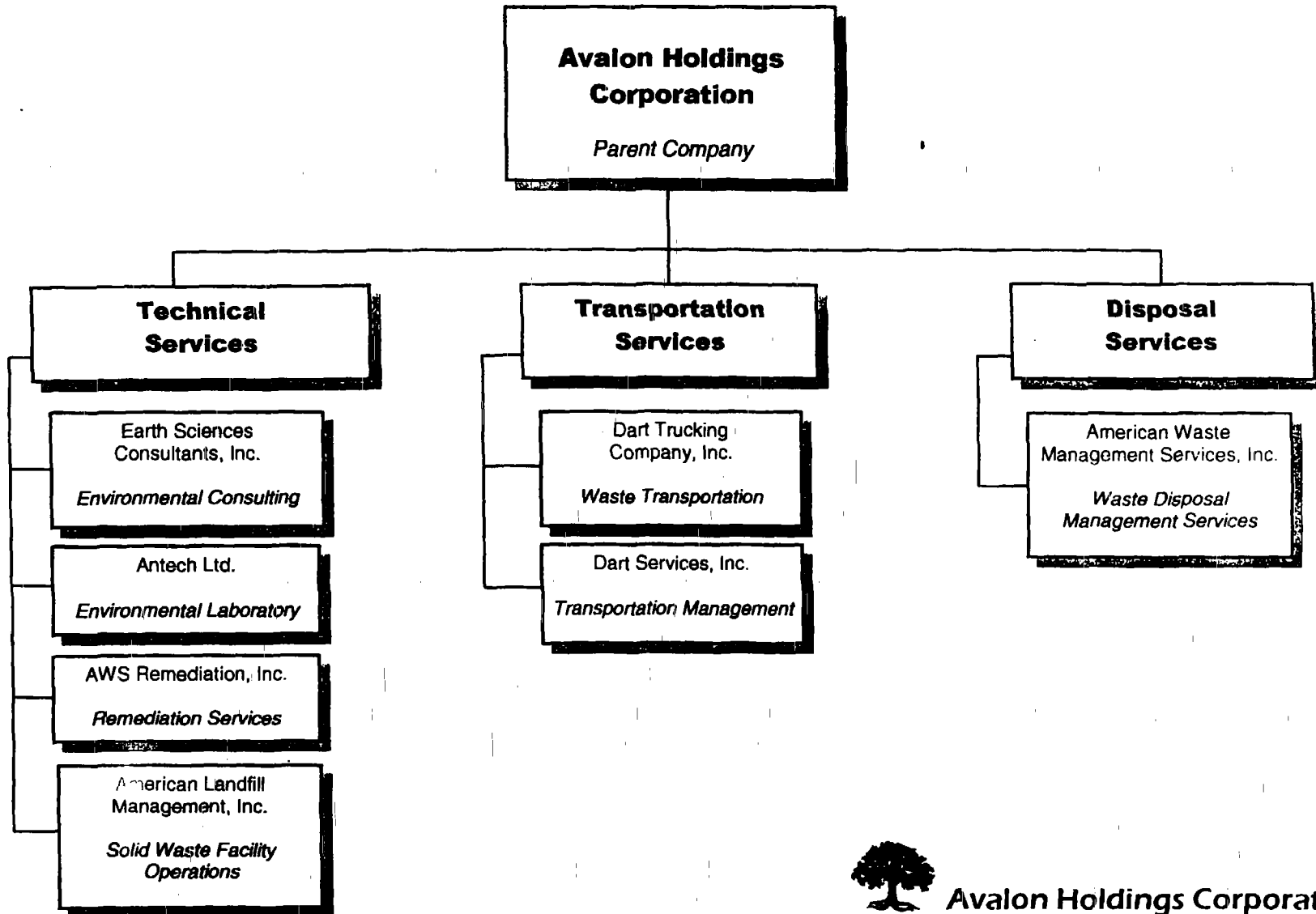
AWS Remediation, Inc. is a remedial services contractor specializing in the cleanup or resolution of environmental problems. AWS Remediation's capabilities range from small-quantity waste handling to advanced technology remediation. AWS Remediation handles a broad range of waste types including nonhazardous, hazardous, and radioactive. Services provided by AWS Remediation include building/equipment demolition, contaminated soil excavation, battery and drum management, field sampling and analysis, groundwater pumping and treatment, landfill capping and closure, low-level radiological waste decontamination, PCB decontamination, soil bioremediation, soil vapor extraction, solidification, stabilization, and tank decommissioning.

Earth Sciences' parent company, Avalon Holdings Corporation (Avalon) is based in Warren, Ohio. In addition to our environmental consulting, analytical, and remediation services, other Avalon affiliates provide transportation and disposal management services. Through the Earth Sciences organization, our clients have access to the capabilities and services of a fully integrated environmental services firm that offers environmental technical consulting, laboratory analysis, site remediation, waste transportation, and disposal management services. With the combined resources of this organization, Earth Sciences can provide whatever environmental management services are required through a *single source* while exercising close control over all project deliverables, schedules, and budgets.



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# Avalon Holdings Corporation Company Organization



**Avalon Holdings Corporation**

# Selected Client List

## Manufacturing

Admiral Machine, Inc.  
Aerosol, Inc.  
AK Steel  
ALCOA, Inc.  
Armstrong World Industries, Inc.  
American Standard, Inc.  
Ansell Perry, Inc.  
Applied Industrial Technologies  
Armstrong World Industries, Inc.  
Bakerstown Container Corporation  
Beadex Manufacturing Company, Inc.  
Berenfield Containers, Inc.  
Bridgestone/Firestone, Inc.  
BWXT Technologies  
Carbidle Corporation  
CBS, Inc.  
Chase Brass & Copper Company, Inc.  
Chelsea Building Products  
Chemtron Corporation  
Clairton Slag, Inc.  
CM Tech, Inc.  
Colfor Manufacturing, Inc.  
Commercial Stone Co., Inc.  
Cooper Industries  
Cooper Power Systems  
CSM Industries  
Dairy Farm Products  
Edgewater Steel, Ltd.  
Elliott company  
Ellwood Engineered Castings  
Ellwood Quality Steels  
Fansteel Metals  
General Chemical  
Glenshaw Glass Company, Inc.  
Ferro Corporation  
Findlay Refractories  
Kaiser Aluminum  
Kennametal Inc.  
Latrobe Steel Company  
Lauren Architectural Products  
Lenape Forge, Inc.  
Lonestar Industries, Inc.  
LTV Steel Company  
Millmaster Onyx Group  
Neville Chemical Company  
Pitt-Des Moines, Inc.  
PPG Industries, Inc.  
Rexroth Corporation  
Roton Corporation  
Sharon Steel Corporation  
Sharon Tube Company

Sharpsville Container Corporation  
Standard Steel  
The Barker Products Company  
The BFGoodrich Company  
The Goodyear Tire & Rubber Company  
Trinity Industries  
TRW, Inc.  
U.S. Silica  
U.S. Steel  
Watson Standard  
Westinghouse Electric Company, LLC

## Professional Services

Arter & Hadden  
Babst, Calland, Clements and Zomnir  
Beveridge & Diamond, P.C.  
Brouse & McDowell  
Buchanon Ingersoll, P.C.  
Cohen & Grigsby, P.C.  
Cummins Riter Consultants  
Davis, Graham & Stubbs, LLP  
Davis, Margolis & McMahon  
Eckert Seamans Cherin & Mellot  
Fuller & Henry, P.C.  
International Environmental Technologies, Inc.  
Jones, Day, Reavis and Pogue  
Kirkpatrick & Lochart, LLP  
Marriner, Jones & Fitch  
McBride, Baker & Coles  
McCormack Baron & Associates  
Meyer, Darragh, Buckler, Bebenek and Eck  
Reed Smith Shaw & McClay  
Shumaker, Loop & Kendrick, LLP  
Squire, Sanders & Dempsey LLP  
Sommer & Barnard  
Tighe, Evan, Ehrman, Schenck and Paras  
Wayman, Irvin & McAuley  
Zimmer Kunz

## Waste Management

Allied Waste Industries, Inc.  
Waste Management, Inc.

## Public Administration

School District of Philadelphia, PA  
The City of Akron, OH  
The Borough of Evans City, PA  
The Urban Redevelopment Authority of Pittsburgh  
Rochester Area Joint Sewer Authority  
The Borough of Turtle Creek, PA  
Westmoreland County Municipal Authority, PA



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### **Laboratory Services**

- ▶ Inorganic and Organic Analysis
- ▶ Regulatory Program Support
  - CERCLA/SARA
  - SDWA
  - RCRA
  - CWA
- ▶ Treatability Study Lab
- ▶ Site Investigation Support
- ▶ UST Program Support
- ▶ Remediation Program Support

### **Remediation Services**

- ▶ Soil and Groundwater Remediation
- ▶ Battery Management
- ▶ Drum Management
- ▶ Facility Closure
- ▶ Low-Level Radiological Services
- ▶ Impoundment Closure

### **Consulting Services**

- ▶ Air Quality
- ▶ Construction Management
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## **Office Locations Technical Services Companies**

### *Antech Ltd. — Laboratory Services*

One Triangle Lane  
Export, PA 15632  
(724) 733-1161  
Fax: (724) 327-7793

### *AWS Remediation, Inc. — Remediation Services*

One Triangle Lane  
Export, PA 15632  
(724) 733-1009  
Fax: (724) 327-5946

### *Earth Sciences Consultants, Inc. — Consulting Services*

#### *Headquarters*

One Triangle Lane  
Export, PA 15632  
(724) 733-3000  
Fax: (724) 325-3352  
[www.earthsciences.net](http://www.earthsciences.net)

#### *Ohio Operations*

Suite 200  
190 North Union Street  
Akron, OH 44304  
(330) 535-6966  
Fax: (330) 535-8112

#### *Philadelphia Operations*

1129 Evansburg Road  
P.O. Box 1448  
Skippack, PA 19474  
(610) 831-9770  
Fax: (610) 831-9771

#### *Arlington Operations*

5949 10th Road North  
Arlington, VA 22205  
(703) 538-6673  
Fax: (703) 538-6673



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## Engineering Services

### **Solid Waste Services**

- ▶ Site Characterization
- ▶ Feasibility Studies
- ▶ Facility Engineering
- ▶ Construction Operation Plans

### **Process Engineering Services**

- ▶ Process Evaluation
- ▶ Process Design
- ▶ Construction and Start-up
- ▶ Operations

### **Regulatory Compliance Services**

- ▶ Multimedia—Air, Water, Solid Waste
- ▶ Air Quality
- ▶ Solid Waste
- ▶ Water Quality
- ▶ Health and Safety

### **Radiological Site Services**

- ▶ Site Background Investigations
- ▶ Radiological and Chemical Site Characterization Studies
- ▶ Decommissioning Plan Development
- ▶ Agency Negotiations
- ▶ Remedial Alternative Analysis
- ▶ License Management

### **Drafting**

- ▶ Site Plans
- ▶ Digital Topography
- ▶ Process Diagrams
- ▶ Surveying

**E**arth Sciences has been providing environmental-related engineering services since 1979. Our staff includes chemical, civil, environmental, and geotechnical engineers as well as individuals with expertise in chemistry, geochemistry, industrial hygiene, and water quality. Many of our engineers hold Professional Engineering certification in the states where we conduct business. Earth Sciences' knowledge base and vast experience can be combined to provide comprehensive engineering services to support your existing projects or to complete "turn-key" design projects for your site.

Earth Sciences' engineering work in solid waste includes site characterization, design, permitting, groundwater and soil investigations, construction management, closure and remedial assessments at over 100 residual, municipal, and hazardous waste landfills. We have also done planning for new landfills and expansion of existing landfills. Earth Sciences can provide all phases of landfill design as well as construction management and operation assistance.

Earth Sciences' expertise in process engineering ranges from design and installation of site remediation systems to the detailed design of very sophisticated systems for treating industrial and municipal waste streams. We can provide process evaluation services as well as conceptual and detailed design of complex processes. In addition, Earth Sciences provides construction, start-up, and operation and maintenance services for these systems.

Our regulatory compliance services include evaluating a client's regulatory program, evaluating past or current liabilities, and assisting in implementing compliance measures protective of their organization. Our staff includes an interdisciplinary group of engineers and scientists who keep current with state and federal regulations.

Radiological site services provided by Earth Sciences include a full range of support to clients who hold Nuclear Regulatory Commission licenses and those who are listed under the Site Decommissioning Management Plan. Earth Sciences is involved in various stages of the decommissioning process of these facilities including investigations, assessment evaluations, licensing activities, and regulatory negotiations.

Earth Sciences' drafting services include the latest versions of AutoCAD and Softdesk Civil/Survey Designing software. Our drafters are experienced in the preparation of grading plans, site volumes, cross sections, digital topography, process flow diagrams, and detailed piping and instrumentation diagrams. In addition, we have digitizing capabilities and also provide surveying services. These services are available to all engineering staff to support project work.



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### **Process Evaluation**

- ▶ Source Characterization
- ▶ Performance Evaluation
- ▶ Waste Minimization/Recycle Assessment
- ▶ Toxic Reduction Evaluations (TREs)
- ▶ Feasibility Studies

### **Process Design**

- ▶ Conceptual Design
- ▶ Treatability Studies
- ▶ Integration Analysis
- ▶ Detail Process Design
- ▶ Process Control Evaluation
- ▶ Permitting

### **Construction and Start-Up**

- ▶ Bid Document Preparation
- ▶ Bid Evaluation
- ▶ System Construction
- ▶ Construction Management
- ▶ Construction QA/QC

### **Operations**

- ▶ Start-up Assistance
- ▶ Operation and Maintenance
- ▶ Operator Training

## **Process Engineering Services**

**E**nvironmental Process Engineering is a diverse field ranging from design and installation of basic site remediation systems to detailed design of very sophisticated systems for treating complex industrial waste streams. The key to a successful process design is having the experience in design, installation, and start-up of process systems in a wide range of conditions and locations. Earth Sciences' Process Engineering staff has the experience to evaluate and select the appropriate process based not only on design principles, but also on thorough understanding of the operation and maintenance issues of the process. Following is a brief overview of our approach to process engineering.

**PROCESS EVALUATION** — Earth Sciences systematically evaluates site conditions and gathers sufficient technical information to prepare an effective process design. Our multidisciplinary staff can evaluate both physical site conditions and existing operations in order to develop the most appropriate process design for each facility.

**PROCESS DESIGN** — Our diverse background in process design includes the design of soil vapor extraction systems, wastewater treatment and recycle systems, and industrial process facilities. Earth Sciences uses a proven five-step problem solving approach to understand all types of plant conditions. Our approach consists of (1) breaking the process into parts, (2) finding the governing rules for each part, (3) acquiring available data, (4) computing and designing the solution, and (5) verifying the results.

**CONSTRUCTION AND START-UP** — The key to Earth Sciences' success in process design is having the experience in the construction and start-up of numerous processing facilities. Having the ability to visualize the system in the field and having a thorough understanding of the operation and maintenance issues results in a design that can be readily transferred to the field. Earth Science requires our design engineers to participate in field construction and start-up operations to better enable them to design efficient processes with a consideration for long-term operation and maintenance. Earth Sciences has also assisted our clients in preparing bid specifications, bid analysis, contractor selection and construction management.

**OPERATION** — Earth Sciences' engineers and technicians are proficient in the installation and start-up of systems designed by Earth Sciences. These systems have included mobile units built at our offices, transported to the field, and operated by Earth Sciences technicians as well as permanent systems constructed and operated at our clients' facilities. Our staff has also prepared detailed O&M procedures for our systems and has conducted extensive hands-on training sessions for our client's operators.



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## Drafting and Design

### Drafting Services

- ▶ Landfill Designs
- ▶ Construction
- ▶ Geosciences
- ▶ Process Engineering
- ▶ Expert Witness Support

### Equipment

- ▶ Work Stations Using:
  - AutoCAD
  - Softdesk
  - AutoCAD Land Development Package
  - Autodesk Civil Design Package
  - Autodesk Surveying Package
- ▶ Large Kurta Digitizers
- ▶ Scanning Capabilities
- ▶ High Speed HP Color Printers

**E**arth Sciences Consultants, Inc. maintains a full-service computer-aided drafting and design (CADD) department for up-to-date drawing production. Earth Sciences has kept pace with the rapid advances in drafting and design technology and provides clients with a full range of state-of-the-art CADD services.

We offer a full range of drafting capabilities from the simple to the complex. Our services are outlined below:

#### Landfill Design

- Site Plans
- Site Volumes
- Complete Drawing Packages

#### Construction

- Site Plans
- Surveying
- Oversight Assistance

#### Geosciences

- Ground Water Maps
- Geologic Cross Sections
- Phase I Drawings

#### Process Engineering

- Site Layouts
- Process Flow Diagrams
- Process and Instrumentation Diagrams

#### Expert Witness Support

- Site Layouts
- Graphics for Courtroom Proceedings

#### Other Services

- Scanning
- Oversized Document Reproduction
- Raster Image Management



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### **Phase I Site Assessments**

- ▶ ASTM-Compliant Assessments
- ▶ Due-Diligence Surveys
- ▶ Transactional Audits
- ▶ Asbestos Surveys

### **Phase II Site Assessments**

- ▶ Contaminant Distribution Assessments
- ▶ Environmental Media Sampling and Analysis
- ▶ Quarterly Monitoring Activities
- ▶ Monitoring Well and Piezometer Installations
- ▶ Soil Gas Surveys
- ▶ Facility Siting Studies
- ▶ AST/UST Investigations

### **Hydrogeologic Services**

- ▶ Hydrogeologic Investigations
- ▶ Groundwater Modeling
- ▶ Contaminant Migration Modeling
- ▶ Aquifer Characteristics Definition
- ▶ Groundwater Resource Studies
- ▶ Geologic Assessments
- ▶ Geochemistry
- ▶ Stream Surveys

### **Technical Support Services**

- ▶ Environmental Litigation Support
- ▶ Environmental Forensic Investigations
- ▶ Brownfields/Voluntary Corrective Action Programs
- ▶ Regulatory Support/Negotiations
- ▶ Wetlands Delineation
- ▶ Environmental Permitting
- ▶ Geophysical Surveys
- ▶ Data Validation
- ▶ Statistical Data Analyses
- ▶ RCRA Facility Assessments
- ▶ RCRA Corrective Measures Studies
- ▶ Waste Stream Analyses
- ▶ Hazardous Waste Delisting Petitions
- ▶ Radiological Studies
- ▶ PRP Group Management and Technical Assistance
- ▶ Risk Assessments

## **Geosciences Services**

Since our company was founded in 1979, Earth Sciences has been known for our strength in geosciences. With a number of capable experts in diverse fields, Earth Sciences is able to provide technical assistance on virtually any project requiring expertise in geologic or environmental sciences. We have assisted clients whose needs ranged from simple site inspections prior to a purchase, to those involved in environmental litigation requiring extensive, long-term forensic environmental support.

*The Geosciences Department includes more than two dozen professionals, most of whom hold advanced degrees in geology, hydrogeology, or geochemistry. Many of the geologists employed by Earth Sciences are registered professional geologists in approximately 14 states. Our technical staff also includes professionals with degrees in risk assessment, statistics, radiochemistry, wetlands, soil science, and agronomy.*

Most project work handled by the Geosciences staff involves some type of site assessment to evaluate and/or define environmental conditions. Our work has ranged from simple Phase I assessments to multi-phase contaminant assessment projects at facilities with substantial agency oversight. A majority of our projects involve comprehensive data collection and management activities. As such, our staff is very focused on the importance of proper field data collection techniques and the latest developments and methodologies that affect our work.

While data collection and management may be at the heart of each Geosciences project, meeting our clients' overall expectations remains a top priority. All projects are managed by senior staff members with 15 or more years of field and project management experience. As such, the Project Manager understands the importance of gathering data in the proper fashion and the necessity of documenting all activities. Earth Sciences understands that our clients expect us to understand their project goals, complete our project activities as agreed to in the client's scope of work, and to do so on time and within the defined project budget.



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## Radiological Site Services

### Scope of Services

- ▶ Site Background Investigations and Determinations
- ▶ Scoping Survey Assessments
- ▶ Radiological and Chemical Site Characterization Studies
- ▶ Groundwater and Hydrogeologic Assessments
- ▶ Decommissioning Plan Development
- ▶ Federal and State Regulatory Agency Negotiations
- ▶ Dose Modeling for Restricted and Unrestricted Release Scenarios
- ▶ ALARA Analysis
- ▶ Decommissioning Funding Plan Preparation and Development
- ▶ Waste Disposal Alternative Analysis and Costing
- ▶ Remedial Alternative Analysis and Management
- ▶ Final Status Surveys
- ▶ License Management, Modification and Termination

**E**arth Sciences has accumulated over a decade of experience assisting clients in managing sites with low-level radioactive contamination. Our company has provided a full range of support to a number of Nuclear Regulatory Commission license holders including several sites that are currently listed under the Site Decommissioning Management Plan. This involvement in the decommissioning process and its evolving regulatory perspective has allowed Earth Sciences to uniquely position itself to support companies with significant radioactive decommissioning needs.

We are currently assisting several clients with sites in various stages of the decommissioning process. Earth Sciences has successfully developed and executed a strategy to obtain unrestricted release for a portion of a licensed facility wishing to sell its real estate assets while pursuing restricted release for the balance of the facility in order to minimize decommissioning costs. In addition, we are currently conducting both dose assessment evaluations and providing facilitator services for the first NRC-approved Site-Specific Advisory Board as defined under the new Code of Federal Regulations dose-based criteria for restricted release at license termination. This same facility is also undergoing ALARA analysis consistent with the new guidance, "Demonstrating Compliance with Radiological Criteria for License Termination," as it applies to the new license termination criteria.

Earth Sciences has assisted clients in agency negotiations at both the federal and state levels to ensure timely and appropriate licensed activities. We have also prepared numerous license amendments and decommissioning plans as well as disposal option analyses for a variety of clients.



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## Geotechnical Services

### Geotechnical Investigations

- ▶ Exploratory Investigations
  - Soil / Bedrock Coring
  - Air Rotary
  - Hollow-Stem Augering
  - Solid-Stem Augering
  - Geoprobe®
  - ODEX
  - Sonic
- ▶ Soil and Rock Sampling and Characterization
- ▶ In-Situ Strength Evaluations
- ▶ Well and Piezometer Installation

### Geotechnical Engineering

- ▶ Landslide Assessment and Remediation
- ▶ Retaining Walls and Structures
- ▶ Dam Design and Permitting
- ▶ Shallow Foundations
- ▶ Piles and Caissons
- ▶ Soil and Rock Anchors
- ▶ Slope Stability
- ▶ Settlement and Bearing Capacity Assessments
- ▶ Subsidence Evaluation and Control
- ▶ Subgrade Evaluation
- ▶ Pavement Design
- ▶ Grading Plans
- ▶ Specifications and Bid Document Preparation
- ▶ Construction QA/QC and Certification

*Earth...* A highly variable material, specific to a given area, and sensitive and reactive to a wide variety of outside influences. At Earth Sciences Consultants, Inc., our base of expertise is understanding the properties of water, soil and rock, their intimate ability to work together, and the conditions that inhibit their relationship with current development, historical effects, and future potential. Our engineers and scientists are specialized in using the properties of water, soil and rock under a wide variety of conditions, including foundation support, stability, subsidence, and other factors that affect both maintaining and developing properties.

*Sciences...* The study of the systematic knowledge of natural or physical phenomena. The science of geotechnical engineering is based on understanding the properties and behavior of water, soil, and rock when outside factors are introduced. Earth Sciences continually strives to apply the "science" to provide cost-effective and efficient solutions that benefit our clients and their specific site conditions.

*Consultants...* One who provides expert advice. Our scientists and engineers have been evaluating properties and developing viable solutions for over 20 years. Our geotechnical engineers combine geology and engineering to determine site conditions and design viable alternatives that address our clients' needs.

*Inc...* Bringing it all together. Our Geotechnical Engineering Program is a blend of engineering and geosciences services directly geared toward clients interested in evaluating the conditions of their sites. Our association with drillers, geotechnical laboratories, and construction contractors enables us to provide turn-key services from the initial investigation of site conditions through final design and construction assistance.

We encourage you to contact any of the following individuals for further details on our capabilities and programs:

**Harold P. McCutcheon, P.E.**

**Charles R. Beatty, Jr.**



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## Groundwater Assessment Services

### **Problem Assessment**

### **Well Installation**

### **Sampling and Analysis**

### **Aquifer Testing and Characterization**

### **Modeling**

### **Treatment Alternative Evaluation**

### **Treatment System Design**

### **Treatment System Installation**

### **Treatment System Start Up**

### **Operation and Maintenance**

Earth Sciences has been collecting and analyzing soil, waste, and groundwater samples for nearly 20 years. Sampling has been conducted under numerous state and federal programs including CERCLA, RCRA, and state voluntary action programs. Earth Sciences is always aware of the most current protocols to be used when collecting samples. Additionally, we always provide experienced field personnel who are aware of the correct sampling techniques. Various sample collection techniques are used by Earth Sciences including traditional and nontraditional drilling techniques for the collection of soil, rock, and groundwater samples; soil gas sampling; hand auger sampling; surface water and sediment sampling; sludge sampling; sewer line sampling; and many others.

Earth Sciences has performed hundreds of site investigations involving groundwater assessments. Our services have ranged from the initial assessment of groundwater impacts to the ultimate remediation of groundwater contamination. Earth Sciences' integrated approach for these projects includes problem definition, contamination assessment, modeling, design, and construction management of groundwater recovery and treatment systems. Our services begin with a multidisciplinary staff who conducts waste characterization, geologic and hydrogeologic assessments, and evaluation of treatment alternatives prior to system design and implementation. Preliminary studies include hydrogeologic investigations to accurately identify groundwater contamination characteristics and define the nature and extent of contamination, plume migration, and interrelationships between aquifers. As appropriate to the project, Earth Sciences can provide soil and groundwater sampling and analysis, well construction, and aquifer testing/characterization. Our staff can also utilize various groundwater modeling software to evaluate, simulate, and predict the performance of hydrologic regimes. Once characterization is complete, we can evaluate various recovery, containment, and treatment technologies as they apply to site-specific situations. After the appropriate solution is identified, Earth Sciences can implement the detailed design of the desired groundwater treatment system. Our engineers and scientists provide full-scale process design packages including flow diagrams, piping and instrumentation diagrams, and equipment specifications. Construction management and system start-up services can also be provided.



**Earth Sciences Consultants, Inc.**

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## Health and Safety Services

- ▶ **Health and Safety  
Surveys and Audits**
- ▶ **Program Development**
- ▶ **Indoor Air Quality  
Investigations**
- ▶ **Industrial Hygiene  
Sampling**
- ▶ **Environmental Sampling  
and Monitoring**
- ▶ **Noise Investigation**
- ▶ **Workplace Training**
- ▶ **Community Relations  
Presentations**
- ▶ **Hazard Assessment and  
Management**

**E**arth Sciences has significant experience in planning and implementing lagoon, impoundment and landfill closure projects. This experience includes the following activities:

Earth Sciences offers comprehensive health and safety services under the direction of a Certified Industrial Hygienist and Certified Safety Professional. These services range from basic industrial hygiene sampling through the design of complete health and safety programs for facilities and operations. We provide, design, and evaluate educational programs pertaining to workplace health and safety and community relations. Litigation support in the forms of research and expert witness testimony are also available.

In the current health and safety environment, it is no longer sufficient to simply comply with regulations. Earth Sciences provides options to our clients that achieve regulatory compliance, protect worker health and safety, reduce compliance and compensation costs, and limit liability. To this end, Earth Sciences services include traditional workplace concerns, like exposure to chemical and physical hazards; cutting edge issues such as indoor air quality and ergonomics; and specialty areas devoted to an individual client or industry.

In addition to workplace issues, Earth Sciences provides evaluations and solutions for health and safety concerns focusing on the general public. These may include evaluation of the health risks associated with the migration of industrial materials beyond property boundaries, hazardous environments in residential settings, and population exposure scenarios.



**Earth Sciences Consultants, Inc.**



# Groundwater Monitoring Services

## **Work Plan Preparation**

## **Data Collection and Validation**

## **Data Management**

## **Data Summarization / Reporting**

## **Turnkey Sampling, Analysis and Reporting**

For nearly two decades, Earth Sciences has provided groundwater sampling, analysis, data management, system evaluation, and reporting services to both industrial and waste management clients. We work for clients responsible for single facilities as well as for those managing as many as 70 sites in 20 states. We recognize the importance of properly collecting and analyzing aqueous samples; managing, documenting, and reporting the required information; and strategically evaluating the system relative to its performance in meeting groundwater monitoring program objectives.

Earth Sciences' full-service work scope is always tailored to meet the client's specific needs for cost effectively obtaining and understanding groundwater data. Our services can include:

- Development of a site-specific sampling/analysis plan to ensure the collection of representative groundwater samples.
- Groundwater monitoring, well purging, and sampling conducted by experienced environmental technicians.
- Validation of laboratory data according to the implemented protocols.
- Ability to perform data management in a multitude of computerized databases including client-specific database requests.
- Data presentation in easily understandable formats such as summary data tables, statistical data test summaries, graphs, time-trend plots, isoconcentration maps, chemical distribution maps, and groundwater flow maps.
- Evaluation and interpretation of chemical and water level data to meet the system/program objectives.
- Reporting in a variety of formats including regulatory agency forms and management, assessment, and data transmittal reports.
- Use of our affiliate laboratory, Antech Ltd., to provide a turnkey package of sampling, analyses, and reporting when desired.



**Earth Sciences Consultants, Inc.**

**Before Deciding to Expand Your Public Water Supply System, Consider This:**

An inventory of your existing water system may determine that you can meet current and future demands by:

- ▶ Rehabilitating current production wells
- ▶ Rehabilitating wells that are not currently used due to drop off in productivity
- ▶ Deepening existing wells to intersect deeper water bearing zones
- ▶ Aquifer development/Aquifer Stimulation by hydrofracturing techniques
- ▶ Eliminating leaks in the system

An inventory of your system could save your community time and money. Earth Sciences works with Public Water Suppliers to provide an inventory of the water supply system and to recommend the most cost effective approach to meet your current and future water supply demands. The inventory of your system can also be integrated into the community's Geographical Information System.

## New Groundwater Source Development for Public Water Supplies

Earth Sciences' staff of hydrogeologists are experienced in developing groundwater resources that provide viable drinking water sources to Public Water Suppliers across Pennsylvania. A viable drinking water source is one that provides a sufficient supply of water for minimal costs to the Public Water Supplier (PWS). Earth Sciences works with the Public Water Supplier to determine the most feasible location for groundwater development based on the geology, the ease of access to the area, the potential for well interference, as well as, the logistics, such as proximity to existing or proposed water mains.

Earth Sciences keeps costs to the PWS to a minimum by:

- Determining up front, the feasibility of developing groundwater in the area. This study evaluates groundwater quality in general and defines whether there is enough water within the basin to provide the proposed withdrawals without creating detrimental impacts to baseflow (streams, creeks, or rivers) or groundwater users within the basin.
- Working with the PWS to identify test well sites based on the best sites geologically, as well as, logistically. Suitable well sites are identified based on review of hydrogeological literature for the specific area, review of water well inventory files, completion of a fracture trace analysis and a field reconnaissance. The well sites are then ranked based on the strength of geologic features, ease of access, potential for contaminant source impacts, potential for well interference, and proximity to the existing water system.
- Conducting field tests for water quantity and water quality during the test well installation. An estimate of the potential yield and water quality of the test well can be determined in the field during test well installation. This information can be used to determine if the test well would be a viable drinking water source when converted to a production well.
- Eliminating delays in the Permit Application Approval process by communicating with the Pennsylvania Department of Environmental Protection from the beginning to the end of the project. Earth Sciences prefers to include the Pennsylvania Department of Environmental Protection from the very beginning of the project to ensure that the project meets PADEP's requirements, eliminating any problems that could potentially delay the approval of the permit application.



**Earth Sciences Consultants, Inc.**

## Site Development Services

### Site Development Services

Phase I/Phase II Assessments

Site/Utilization Plan Development

Geotechnical Investigations

Geotechnical Engineering  
(Foundations, Slope Stability,  
Settlement, Subsidence)

Mine Stabilization

Sewage Planning Modules

Grading Plans

Roadway Layout Arrangements

Stream Crossing Permitting

Utility Plans

Building Permits

Erosion and Sediment Control  
Planning and Permitting

Wetland Delineations/ Mitigation

Public Meeting Assistance

Regulatory Agency Liaison  
Assistance

Zoning/Planning Commission  
Meeting Assistance

Specifications and Bid Document  
Preparation

Construction QA/QC and  
Certification

Construction Management

Today, environmental regulations, governmental agencies and legal liabilities play an important role in earthwork, construction, paving and building development.

Earth Sciences Consultants, Inc. can help. Our team of engineers and scientists offer a comprehensive range of services in land development. Many projects today begin with property Phase I and II assessments, and proceed to geotechnical investigations and engineering; site layout and design; regulatory and community involvement; and a final construction package. Earth Sciences has the capabilities to assist our clients in any or all of these tasks.

Our Site Development Program is a blend of engineering and geoscience services directly geared toward clients interested in developing greenfields; redeveloping brownfields for residential, commercial and industrial uses; and conventional development projects. The program focuses on geologic and engineering design activities required to support the development or re-use of property. We can also address environmental remediation activities at a site through our associated Brownfields Program.

Because of Earth Sciences' unique capabilities, we are able to offer our clients a wide range of services not readily found with other firms. Offering multiple capabilities has historically saved our clients time and money. We can simultaneously investigate both the environmental and geotechnical conditions at a site, providing our clients with more complete information regarding their development project. We are also able to provide civil and geotechnical engineering, drafting/surveying services, and construction support to our clients. Our capabilities eliminate the need for hiring multiple firms for subsequent investigative and development tasks and minimizes the time-consuming activity of coordinating contracts and services from separate providers.

We have the technical expertise and experience to address all your needs. We encourage you to contact us for further details on our programs and capabilities. If we can be of service to you, please contact any of the following Earth Sciences personnel:

**Harold P. McCutcheon, P.E.**

**Charles R. Beatty**

**Teresa A. Sekscinski**



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## Water Quality Management Services

### Compliance Assistance

- ▶ Compliance Assessment/Strategic Planning
- ▶ Sampling and Analysis
- ▶ Discharge Monitoring Reports
- ▶ Operational and Engineering Assistance
- ▶ Long-Term Monitoring
- ▶ Regulatory Negotiations
- ▶ Developing Site-Specific Criteria
- ▶ Water Quality Modeling
- ▶ Thermal Variance Demonstrations
- ▶ Aquatic Assessments/Stream Surveys
- ▶ Watershed Studies
- ▶ Data Validation/Statistical Analyses

### Facility Plan Preparation

- ▶ Erosion and Sedimentation Control Plans
- ▶ Storm Water Pollution Prevention Plans
- ▶ Integrated Contingency Plans
- ▶ Spill Prevention, Control, and Countermeasures Plans
- ▶ Preparedness, Prevention, and Contingency Plans
- ▶ Wetlands Evaluations and Delineations

### Permit Applications

- ▶ NPDES Discharge and Storm Water
- ▶ Sanitary Sewer Discharge
- ▶ Air Quality for Wastewater Treatment Plants
- ▶ Joint Permit Applications
- ▶ USCOE Nationwide Permits
- ▶ Water Obstruction and Encroachment Permits

Since 1979, Earth Sciences has provided a full range of environmental consulting and permitting services to industrial clients throughout the United States. We have nearly 20 years of experience in water quality permitting and compliance assistance and have provided services to our clients that range from sampling and analysis of outfalls through completing permit applications and negotiating with state and federal agencies.

Earth Sciences has completed numerous projects for waste disposal and industrial sites under various State and National Pollutant Discharge Elimination System Programs including all phases of compliance management. In addition to providing permitting assistance, Earth Sciences has provided technical support during litigation with both the state and the U.S. Environmental Protection Agency over final effluent limitations for NPDES permits. Earth Sciences has developed response comments for the draft permits and has assisted clients in developing appeals of the final effluent limitations.

Earth Sciences is affiliated with a full service environmental laboratory, Antech Ltd. Antech and Earth Sciences work hand-in-hand on water quality projects that require one-time, intermittent, or routine sampling and analysis. Antech operates under a strict QA/QC program to ensure dependable results. Antech and Earth Sciences are located in the same office complex which enhances Earth Sciences' ability to closely monitor sample analysis and reporting.



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www.earthsciences.com